

Reducing Gravity at the Superfluid Transition in Helium n-4

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There are two intrinsic experimental limitations in transport measurements near T_λ in traditional ground based experiments: the gravitationally induced pressure variations present in any macroscopic helium sample limit how closely the transition can be approached, and the onset of convection in a sample with $T > T_\lambda$ limits the range of heat values that can be used. To overcome these limitations, we have built a low gravity simulator consisting of a superconducting magnet with a magnetic field profile shaped to provide a magnetic force on the helium opposite that of gravity. Preliminary measurements in the low gravity simulator have shown the decrease in the range of reduced temperatures and the suppression of the onset of convection as the effective gravity was varied from 1 to 0.01g on a small helium sample.

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